CLAIMS

1. A frequency synthesizer comprising:

a fixed frequency generator configured to generate a fixed frequency signal;

a variable frequency generator configured to generate a variable frequency signal;

wherein the fixed frequency signal and the variable frequency signal are combined to provide a fast-hopping output signal.

2. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator has an output that is not connected back to other components of the variable frequency generator.

3. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator settles substantially faster than fixed frequency generator.

4. A frequency synthesizer as recited in Claim 1 further comprising a mixer configured to combine the fixed frequency signal and the variable frequency signal.

5. A frequency synthesizer as recited in Claim 1 wherein the frequency synthesizer is included in a transceiver.

6. A frequency synthesizer as recited in Claim 1 wherein the frequency synthesizer is used in an ultra-wide band (UWB) system.

7. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a signal generator and a fast switching component for configuring the signal generator.

8. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a signal generator and a fast switching component for operating on a plurality of generated signals by the signal generator.

9. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a direct digital synthesizer.

10. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a direct digital synthesizer comprising:

a digital to analog converter (DAC);

a parameter generator coupled to the DAC;

wherein the parameter generator is configured to provide a configuration parameter to the DAC, and the DAC is configured to generate the variable signal based on the configuration parameter.

11. A frequency synthesizer as recited in Claim 10 wherein the parameter generator includes a lookup table.

12. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes an injection-locked synthesizer; and the fixed frequency signal is an input to the injection-locked synthesizer.

13. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes an injection-locked synthesizer comprising:

a ring oscillator having a plurality of stages, where each of the plurality of stages has a stage output; and

a logic processor configured to perform operations on at least one of the stage outputs to obtain the variable frequency signal.

14. A frequency synthesizer as recited in Claim 13, wherein the logic processor is configured to perform an exclusive-or operation.

15. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a delay locked loop.

16. A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes:

a delay locked loop having a plurality of stages, wherein each of the plurality of stages has a stage output; and

a logic processor configured to perform an operation on at least one of the stage outputs to obtain the variable frequency signal.

17. A fast-hopping frequency synthesizer comprising:

a voltage controlled oscillator (VCO) configured to generate a fast-hopping output signal; and

a VCO controller coupled to the VCO for providing a first VCO configuration and a second VCO configuration;

wherein the VCO controller switches between the first VCO configuration and the second VCO configuration at a fast-hop switching speed.

18. A frequency synthesizer as recited in Claim 17 wherein the fast-hopping output signal is directly synthesized.

19. A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a memory for storing a configuration used to determine a VCO input.

20. A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal.

21. A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal;

wherein the feedback loop comprises a frequency detector configured to provide a feedback to the VCO controller.

22. A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal;

wherein the feedback loop comprises a frequency detector configured to provide a feedback to the VCO controller, and the frequency detector detects a difference between a divided output and a divided reference frequency.

23. A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a digital to analog converter configured to control the VCO input.

24. A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a switch cap digital to analog converter configured to control the voltage controlled oscillator input.

25. A method for synthesizing a fast-hopping signal, comprising:

generating a fixed frequency signal;

generating a variable frequency signal; and

combining the fixed frequency signal and the variable frequency signal to provide the fast-hopping signal.

26. A method for synthesizing a fast-hopping signal, comprising:

providing a first voltage controlled oscillator (VCO) configuration to a VCO;

switching to a second VCO configuration at a fast-hopping switching speed; and

generating the fast-hopping signal.

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